CLAIMS

1. A rotor using an electrical steel sheet with low iron loss, the rotor comprising:

a bridge side on an inner circumference of a magnet insertion window of said rotor, a strength of said bridge side improved by means of applying a laser peening of irradiating said bridge side with a laser through a liquid.

2. A rotor as claimed in claim 1, in which said bridge side irradiated with the laser is a region where a high stress occurs due to centrifugal force acting on a magnet when said rotor rotates.

3. A rotor as claimed in claims 1 or 2, in which a magnet of said rotor for each pole is divided into a plurality of pieces.

4. A rotor as claimed in one of claims 1-3, in which said bridge side has a step (303A, 304A).

5. A rotor as claimed in claim 4, in which said step (303A, 304A) is located on one side or each side.

6. A method of manufacturing a rotor using an electrical steel sheet with low iron loss, the method comprising:

applying a laser peening of irradiating with a laser through a liquid a bridge side on an inner circumference of a magnet insertion window of said rotor to improve strength of said bridge side.

7. A method of manufacturing a rotor as claimed in claim 6, in which said bridge side irradiated with the laser is a region where a high stress occurs due to centrifugal force acting on a magnet when said rotor rotates.

8. A method of manufacturing a rotor as claimed in claims 6 or 7, in which a plurality of said rotors are used to be stacked.

9. A method of manufacturing a rotor as claimed in claim 8, in which said rotors are held together under mutual pushing condition.

10. A method of manufacturing a rotor as claimed in one of claims 6-9, in which a magnet of said rotor for each pole is divided into a plurality of pieces.

11. A method of manufacturing a rotor as claimed in one of claims 6-10, in which said bridge side has a step (303A, 304A).

12. A method of manufacturing a rotor as claimed in claim 11, in which said step (303A, 304A) is located on once side or each side.

13. A method of manufacturing a rotor as claimed in claims 11 or 12, in which said step is formed by a press.

14. A method of manufacturing a rotor as claimed in one of claims 6-13, in which said rotor is formed by a punching.

15. A laser peening method of irradiating a rotor made of a low iron loss electrical steel sheet with a laser through a liquid, the laser peening method comprising:

irradiating with the laser a bridge side on an inner circumference of a magnet insertion window of said rotor while moving said rotor relative to an irradiation spot (S) of the laser, to improve strength of said bridge side.

16. A laser peening method as claimed in claim 15, in which process debris generated on an irradiation plane of the laser is removed from a light path of the laser by means of causing the liquid located at the irradiation plane to flow.

17. A laser peening method as claimed in claims 15 or 16, in which a plurality of said rotors are stacked.

18. A laser peening method as claimed in claim 17 in which said rotors are held together under mutual pushing condition.

19. A laser peening method as claimed in claim 18, in which said irradiation spot (S) of the laser is moved in an inner circumference direction of said rotor while being fed in a stacking direction and in which a center of said irradiation spot (S) of the laser is located

within a range corresponding to one half of a thickness of said rotor in a middle portion in thickness of said rotor.

20. A laser peening method as claimed in claim 19, in which a feeding pitch of said irradiation spot (S) of the laser substantially matches with the thickness of said rotor.

21. A laser peening method as claimed in claims 19 or 20, in which a value obtained by dividing a diameter of said irradiation spot (S) of the laser by the thickness of said rotor lies within a range of 1.1-3.

22. A laser peening method as claimed in one of claims 15-21, in which the movement of said rotor relative to said irradiation spot (S) of the laser is controlled based on detection of a position of said rotor relative to said irradiation spot (S) of the laser and/or detection of laser peening condition.

23. A laser peening method as claimed in claim 22, in which said detection of a position of said rotor relative to said irradiation spot (S) of the laser utilizes an image obtained by an optical observation of vicinities of said irradiation spot (S) of the laser.

24. A laser peening method as claimed in claim 22, in which said detection of laser peening condition utilizes plasma lighting caused by laser irradiation.

25. A laser peening method as claimed in claim 22, in which said detection of laser peening condition utilizes a sound induced by laser irradiation.

26. A laser peening apparatus comprising:

a laser irradiating device for irradiating a rotor made of low iron loss magnetic steel with a laser through a liquid; and

a drive device for moving said rotor relative to an irradiation spot (S) of the laser in such a way that the laser irradiates said rotor along a bridge side of an inner circumference of a magnet insertion

window of said rotor.

27. A laser peening apparatus as claimed in claim 26, further comprising a liquid flow device for causing a liquid to flow over an irradiation plane of the laser.

28. A laser peening apparatus as claimed in claims 26 or 27, further comprising a pressurizing member for keeping a plurality of stacked rotors together under mutual pushing condition.

29. A laser peening apparatus as claimed in claim 28, in which said drive device moves said irradiation spot (S) of the laser in an inner circumference direction of said rotor while feeding said irradiation spot (S) of the laser in a stacking direction of said rotor, and in which a center of said irradiation spot (S) of the laser is controlled to occupy a range corresponding to one half of a thickness of said rotor, including a thickness center of said rotor.

30. A laser peening apparatus as claimed in claim 29, in which a feeding pitch of said irradiation spot (S) of the laser substantially matches with the thickness of said rotor.

31. A laser peening apparatus as claimed in claims 28 or 29, in which a value obtained by dividing a diameter of said irradiation spot (S) of the laser by the thickness of said rotor lies within a range of 1.1-3.

32. A laser peening apparatus as claimed in one of claims 26-31, in which said drive device is controlled based on detection of a position of said rotor relative to said irradiation spot (S) of the laser and/or detection of laser peening condition.

33. A laser peening apparatus as claimed in claim 32, further comprising an imaging device (811) for optically observing vicinities of said irradiation spot (S) of the laser, in which said detection of a position of said rotor relative to said irradiation spot (S) of the laser utilizes an image observed by said imaging device (811).

34. A laser peening apparatus as claimed in claim 32, further comprising a light measurement device for measuring plasma lighting generated by laser irradiation, in which said detection of laser peening condition utilizes said plasma lighting measured by said light measurement device.

35. A laser peening apparatus as claimed in claim 32, further comprising a sound measurement device (821) for measuring a sound induced by plasma generated by laser irradiation, in which said detection of laser peening condition utilizes said sound measured by said sound measurement device (821).